REMARKS:

1) The insertion of the word "substantially" in line 18 of page 7 of the specification conforms the Summary of the Invention to the statement in line 1 of page 9 of the specification where it said that: "The heated surface then comprises a minimal temperature gradient". This statement means that the temperature of the function layer is substantially constant in all locations of the function layer (4) of the sensor. When the heated surface of the function layer (4) has a minimal temperature gradient it follows that the temperature of the function layer is substantially constant. Therefore, the proposed insertion at the end of line 1 on page 9 of the specification is fully supported by the original context and new matter is not involved.

2) The insertion in line 19 on page 8 to the effect that an exact temperature regulation is provided by a closed loop control is fully supported by the context which refers in line 18 to an exact temperature regulation. This exact temperature regulation is made possible by the features of the invention.

3) The rejection of claims 32 to 51 under §35 USC 112, first paragraph is respectfully traversed for the following reasons. The term "regulated" is used in lines 1 to 4 at the top of page 3 of the present specification as originally filed where these four lines indirectly state an object of the invention. Further,

the term "temperature regulation" is used in line 18 of page 8 of the present disclosure as originally filed with the literal and accurate translation of the original specification. Applicants are not attempting to correct an initially incorrect or incomplete translation because there is no translation error that needs to be corrected. The original translation is literal and accurate and hence correct. The reference to a "closed loop control" is fully supported by the originally used terms "regulated" and "temperature regulation". Reference is made in this connection to enclosed Exhibit A "McGraw-Hill Encyclopedia of Science and Technology" Vol. 3, page 429 left column. There it is said:

> "A regulated system is a closed loop control system in which the controlled quantity is held substantially constant. In such a system the controller is called the regulator. Closed loop control systems are covered in this article."

Based on the art acknowledged connotation of the terms "regulated" and "regulation" as supported by enclosed Exhibit A, the clarification proposed for insertion on pages 7, 8 and 9 and in the claims is fully supported by the original disclosure. Withdrawal of the rejection based on "new matter" is respectfully requested because new matter has not been introduced, neither in the specification nor in the claims.

4) Further, the reason for the statement in the Office Action on page 2 that there is no support for maintaining the operating temperature constant throughout the gas sensor function layer, has now been obviated by the combination of features from the allowable dependent claims to form new independent claims as set forth above in the new proposed claims 52 to 68. Entry of claims 52 to 68 into the official record is respectfully requested.

5) The reference to a constant temperature has been rephrased in all independent claims 52, 57, 61, 65 and 68 to the effect that the "operating temperature is maintained at a minimal temperature gradient". This clarification is fully supported by the original disclosure page 9, line 1.

6) In view of the above withdrawal of all rejections under 35 U.S.C. §112, first paragraph is respectfully requested.

7) The new claims 52 to 68 are based on previous claims 1, 32 to 51 and in part on the original disclosure in Figs. 4a, 5a and 6 to 10, as follows.

New Claims	52 IND)	53	54	55	56	57 (IND)	58	59	60
Original Support	32,33, (34)	35	39	40	44	32,37, (38)	44	39	40

New Claims	61 (IND)	62	63	64	65(IND)	66	67	68(IND)
Original Support	32,45; Figs.6 to 10	44	35	39	1+(34)	35	44	Cl.1+(34)+ Figs. 4a, 5a, 6 to 10

(34) (38) claims indicated to contain allowable features. The new claims 52 to 68 do not contain any new matter.

8) As indicated in the above table, each of the independent claims 52, 57, 65 and 68 includes features of dependent claims 34 or 38 that were indicated in the Office Action of October 31, 2003 to contain allowable subject matter. Therefore, independent claim 52 with dependent claims 53, 54, 55 and 56; independent claim 57 with dependent claims 58, 59 and 60; and independent claim 65 with dependent claims 66, 67 and independent claim 68 should now be in condition for allowance.

9) The independent claim 61 is a combination of claims 32 + 45 plus the feature that the two meandering amplitudes of the heater sections and the intermediate heater portion (6C) form an electrical heater series connection as shown for example in each of Figs. 6 to 10. The two sensor conductors (12A, 12B) are connected to this series connection. Such a structure is not shown by the prior art including DE 195 23 301 (Hahn et al.) taken separately.

10) It is appreciated that Section 8 on page 5 of the Office Action of October 31, 2003 indicates allowable subject matter in the location of the contact points (12A', 12B') as spaced along the intermediate heater portion. However, such limitation is not justified by the prior art as will be explained below. Therefore, independent claim 61 has been drafted to combine claim 32 with claim 45 plus the disclosure of Figs. 6 to 10, which show the contact points (12A' and 12B') to be spaced from each other

along the electrical series connection at a predetermined spacing between the two contact points. Thus, independent claim 61 and the claims 62, 63 and 64 dependent on claim 61 cover what is shown in Figs. 6 to 10. Including in claim 61 the features of claim 48 would limit such a claim to what is shown in Fig. 8. The references do not justify such a limitation for the following reasons.

11) The rejection of claim 45 as being anticipated by German Patent Publication DE 195 23 301 A1 is respectfully traversed. Referring to Fig. 1 of this German reference, the two heater portions (H), one inner portion (H) and one outer portion (H), are connected in parallel to each other, not in series. The inner ends of the two sensor conductors (ML1, ML2) are connected to this parallel connection of the inner and outer heater portion (H), not to any series connection. Therefore, this German Patent Publication cannot anticipate claim 45.

12) It is respectfully submitted that the above outlined combination of features as defined in claim 61 is patentable even if DE 195 23 301 is taken in combination with US Patent 4,776,943 (Kitahara). Therefore, the rejection of claim 45 under 35 U.S.C. §103(a) is respectfully traversed. Although Kitahara's heater (11, 41) has a meandering heater configuration no temperature sensor conductors are connected to the heater itself. Rather, the sensor conductors (25 and 26) are connected to separate

sensor electrodes (16 and 17), please see col. 4, last paragraph of Kitahara. Therefore, Kitahara does not provide any suggestion that could motivate one skilled in this art at the time the invention was made to combine the two references.

13) Similar considerations apply to the rejection under 35 U.S.C. §103(a) in view of the above mentioned German reference taken in the light of US Patent 5,895,591 (Kojima et al.), because Kojima's detector electrodes (17) are supported on a separate substrate (15). Thus, Kojima's sensor or detector electrodes (17) are not connected to the heater, much less to a series connected heater. In view of the foregoing remarks all rejections under 35 U.S.C. §102(b) and 35 U.S.C. §103(a) are respectfully traversed and withdrawal of these rejections is respectfully requested, as far as claim 45 (now in claim 61) is concerned.

14) Independent claim 65 and its dependent claims 66 and 67 are also in condition for allowance because independent claim 69 combines the features of original claim 1 with allowable claim 34. Claim 34 covers the meandering heater amplitudes that diminish toward the tip (10) of the sensor. This feature is indicated to be allowable as set forth in section 8 on page 5 of the Office Action. Thus, it is respectfully submitted that claims 65, 66 and 67 are also in condition for allowance.

15) Independent claim 68 is a combination similar to that of claim 65 and defines additionally at least two groups of heater sections with path lengths diminishing toward the tip (10) as shown in the present Figs. 4a, 5a and 6, 7, 8, 9 and 10. Fig. 4a shows an upper group and a lower group of meandering and diminishing heater sections. Figs. 5a and 6 to 10 also show that the amplitudes of neighboring meandering heater sections forming a group diminish toward the tip (10). These Figs. show each four groups of heater sections. However, the second group begins with a larger length or amplitude and then continues to diminish toward the tip (10). Claim 68 is intended to cover what is shown in Figs. 4a, 5a and 6 to 10. The references taken singly do not show such a heater path pattern. The references taken in combination also do not suggest such a heater path pattern.

16) The paragraph proposed for insertion on page 18 of the specification describes what is originally shown in Figs. 5a and Figs. 6 to 10. Therefore, no new matter is involved in stating that heater sections form groups. The first group diminishes toward the second group which begins with a larger heater path length or amplitude of its first heater section and then also diminishes toward the tip. Hence, both groups of heater sections diminish toward the tip (10).

17) Entry of claims 52 to 68 is respectfully requested. Favorable consideration and allowance of claims 52 to 68 are respectfully requested.

Respectfully submitted,

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Applicant

By W. G. Fasse

WGF:ar/4191
Enclosures:
Form PTO-2038,
EXHIBIT A

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I hereby certify that this correspondence with all indicated enclosures is being transmitted by telefax to (703) 872-9306 on the date indicated below, and is addressed to: COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450.

Anita Morse - January 28, 2004
Name: Anita Morse - Date: January 28, 2004

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Docket No.: 4191
USSN: 09/890,613
A.U.: 2832
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McGraw-Hill Encyclopedia

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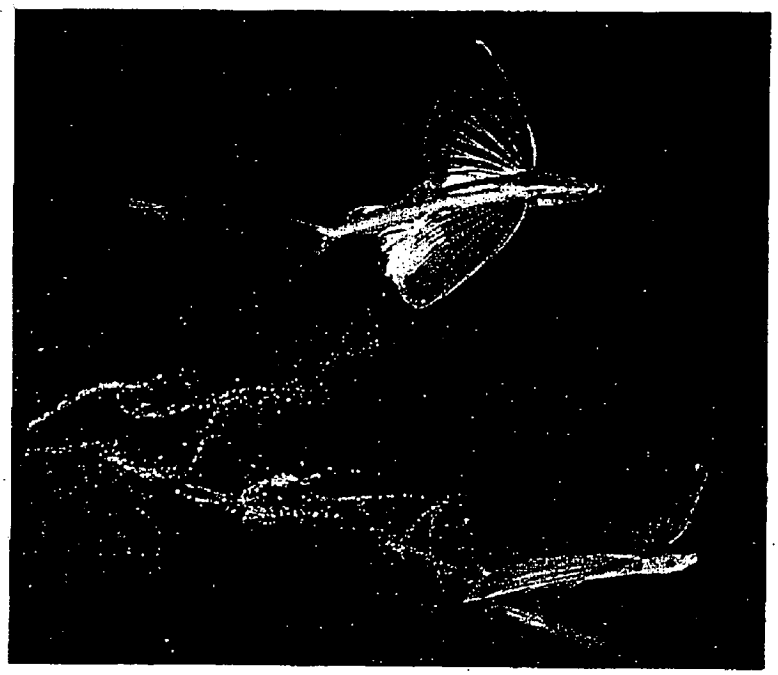

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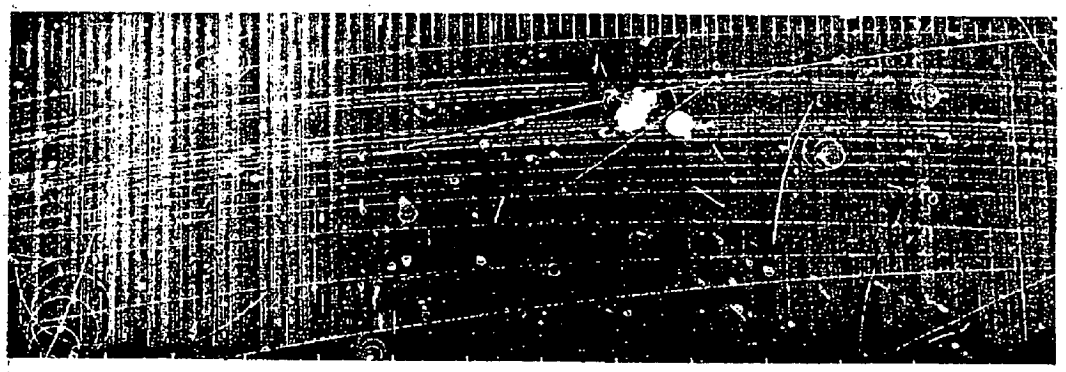

edge of statistical methods are the only limiting factors on the types of charts available to him.

[J.MN.]

Bibliography: American Society for Testing Materials, *ASTM Manual on Quality Control of Materials*, 1951; E. L. Grant, *Statistical Quality Control*, 2d ed., 1952.

Control systems

Systems in which one or more of the outputs must be constrained to follow a prescribed behavior. Control systems are classified as either open-loop or closed-loop systems.

In an open-loop control system the value of the output is directly determined by the input. The heat supplied by an electric radiator is determined by the position of the adjusting switch, not by the temperature of the room. For a different outside temperature a different setting must be used to obtain the same desired room temperature. The clock is another example of an open-loop control system designed so that, regardless of changes in inputs to the system (temperature, humidity, location), the rate of movement of the hands remains the same. For further discussion *see* OPEN-LOOP CONTROL SYSTEM.

In a closed-loop, or feedback, control system the difference between the actual value of the controlled output and the desired value of that output is used to change the value of the input to the system in such a manner as to maintain the output at or close to the desired value. A temperature-controlled room is an example of a closed-loop, or feedback, control system in which deviations in the controlled quantity (the temperature) from the desired value are measured and used to regulate the flow of energy into the room in such a manner as to restore the room temperature to its desired value. A regulated system is a closed-loop control system in which the controlled quantity is held substantially constant. In such a system the controller is called the regulator. Closed-loop control systems are covered in this article.

There exists a category of systems in which the output must be controlled to change its value more or less continuously in accordance with changes in one or more inputs. In an antiaircraft-gun system the position of the gun must be accurately controlled to change its position according to information received from a tracking device which instantaneously measures the position of the target. This information is used to compute automatically the required instantaneous gun position, which in turn must be imposed upon the gun.

PRINCIPLES OF OPERATION

A feedback control system can be represented as shown by the block diagram of Fig. 1. It consists of the plant, or controlled system, a measuring device, and a controller. The measuring device detects the value of the quantity to be controlled and compares it continuously with the desired value of that

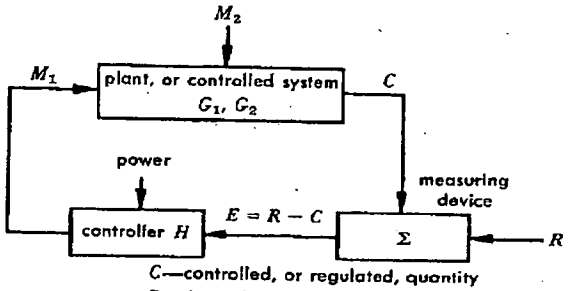

Fig. 1. Block diagram of a feedback control system.

quantity. The controller accepts this information, usually at low power level, and provides an output, the manipulated quantity at a power level required to control the plant. The manipulated quantity is thus an input to the plant, modulated in such a manner as to force the controlled quantity to approach its desired value. The controller often consists of an amplifier to raise the power level of the error signal, a compensating circuit to provide desirable operating characteristics, and an actuator to produce a mechanical motion at relatively high power level.

The controlled system, or plant, has one or more outputs which are to be controlled by manipulating one or more of the inputs to the system. Changes in the value of each output are caused by and related to changes in the inputs. For the simple linear system shown in Fig. 1 the controlled variable C is given by

$$C = G_1M_1 + G_2M_2 \tag{1}$$

where M_1 is the input to be manipulated to achieve control and M_2 represents the load, which may change randomly with time. G_1 and G_2 are mathematical relationships known as the transfer characteristics of the system.

The controller receives as its input the measured difference E between the desired value R and controlled quantity C.

$$E = R - C \tag{2}$$

The output of the controller is the manipulated quantity M_1. The transfer characteristic H of the controller mathematically relates the controller output M_1 to its input E

$$M_1 = HE \tag{3}$$

In general, the input E is a low energy level signal. Since the output M_1 must be at a relatively high energy level, external power must be supplied to the controller. From Eqs. (1), (2), and (3) the difference between the desired value and the actual value of the controlled quantity is